

# **Aerosol / Cloud / SO<sub>2</sub> Session Summary**

**AURA Validation Meeting  
September 11-15, 2006  
Boulder, CO**

*Tuesday, September 12, 1:30 p.m. – 4:15 p.m.*

**Room 2503**

**Aerosol/Cloud/SO<sub>2</sub> Working Group & Validation Subgroup Session**

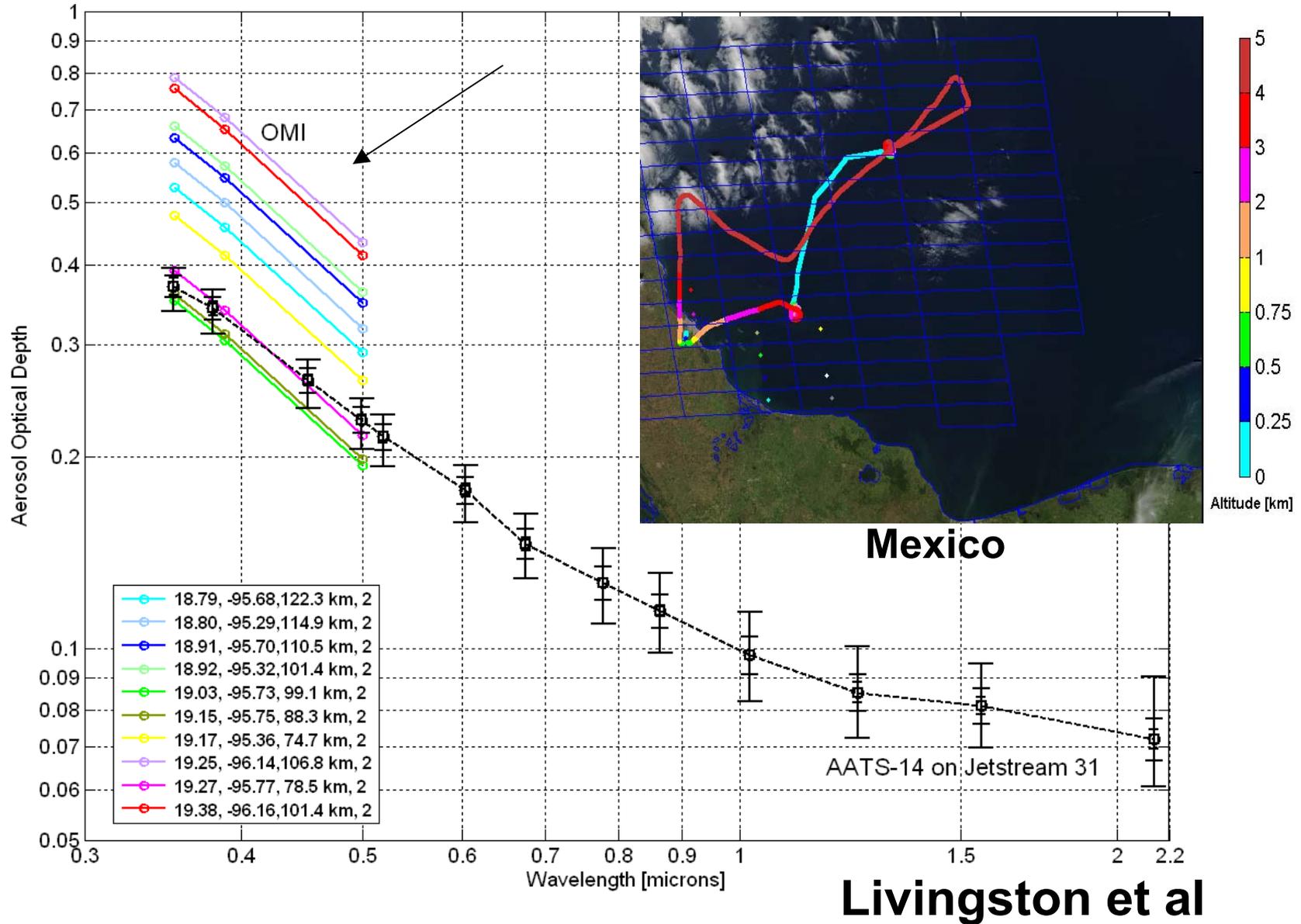
Session chair: Steve Massie ([massie@ucar.edu](mailto:massie@ucar.edu))

1:30 - 1:42	Validation of HIRDLS observations of clouds and aerosols	S. Massie
1:42 - 1:54	MLS version 2 cloud ice and validation plan	D. Wu
1:54 - 2:06	Cross-comparison of Aura MLS and Aqua AIRS cloud measurements	J. Jiang
2:06 - 2:18	Comparisons of TES retrieved cloud products	A. Eldering
2:18 – 2:30	Intercomparisons of OMI and MODIS deep blue aerosol products	C. Hsu
2:30 - 2:42	Information on atmospheric aerosol in OMI measurements	B. Veihelmann
2:42 - 2:54	Aerosol optical depths from airborne sun photometry in INTEX-B/MILAGRO as a validation tool for OMI on Aura	J. Livingston
2:54 - 3:06	Validation of MODIS aerosol observations over the Netherlands with GLOBE student measurements	K. F. Boersma
3:06 - 3:18	NATIVE (Nittany Atmospheric Trailer and Integrated Validation Experiment) remotely sensed aerosol optical properties: examples from INTEX-B and WAVES 2006	B. Taubman
3:18 - 3:30	The 2006 boreal forest fire season as seen by OMI	O. Torres
3:30 – 3:42	OMI aerosol products and validation	R. Braak
3:42 - 4:15	<b>Discussion</b> Current issues / problem areas? Further validation needs? Papers planned for Aura validation special issue? Other topics?	

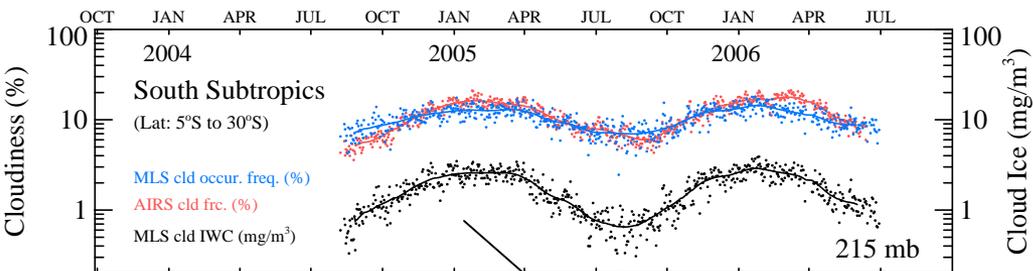
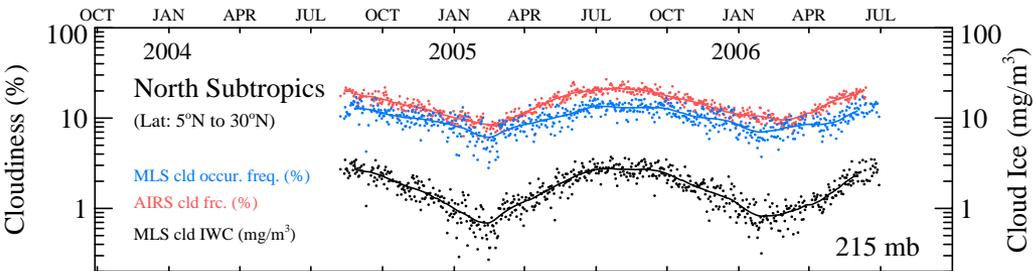
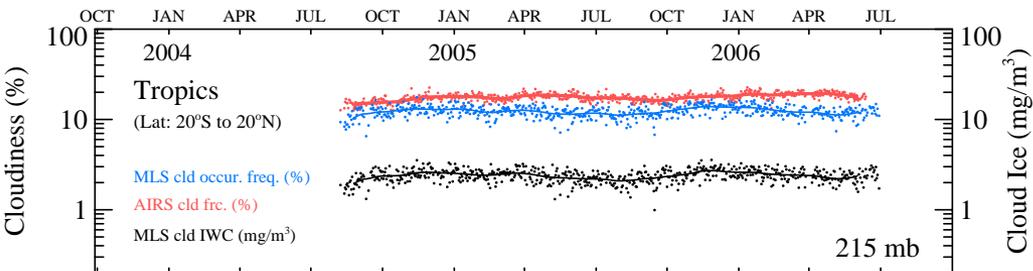
# Validation Comparisons

# Comparison of AOD spectra from AATS & OMI

## 10 Mar 2006



# MLS and AIRS Comparison of Seasonal Cloudiness



The MLS IWC ( $\text{mg}/\text{m}^3$ ) and AIRS  $\langle \text{CFR} \rangle$  (%) are two different quantities and thus they can not compare directly. But time series show they have the same seasonal variation, which they should.

The MLS cloud occurrence frequency (%) is computed as total number of cloud detected divided by total number of samples. They show good agreement with AIRS  $\langle \text{CFR} \rangle$ .

**Time-series of collocate and coincident cloud observations between MLS and AIRS. Each dot represents daily averages for regions of Tropics (top-panel), north subtropics (mid-panel) or south sub-tropics (lower-panel). The solid lines are the monthly running means of the daily values. For all three regions, the different colors illustrate the following: black is the mean MLS IWC ( $\text{mg}/\text{m}^3$ ), red is the mean AIRS  $\langle \text{CFR} \rangle$  (%), blue is the cloud occurrence frequency observed by the MLS.**

**Red – AIRS**  
**Blue - MLS**

**IWC**

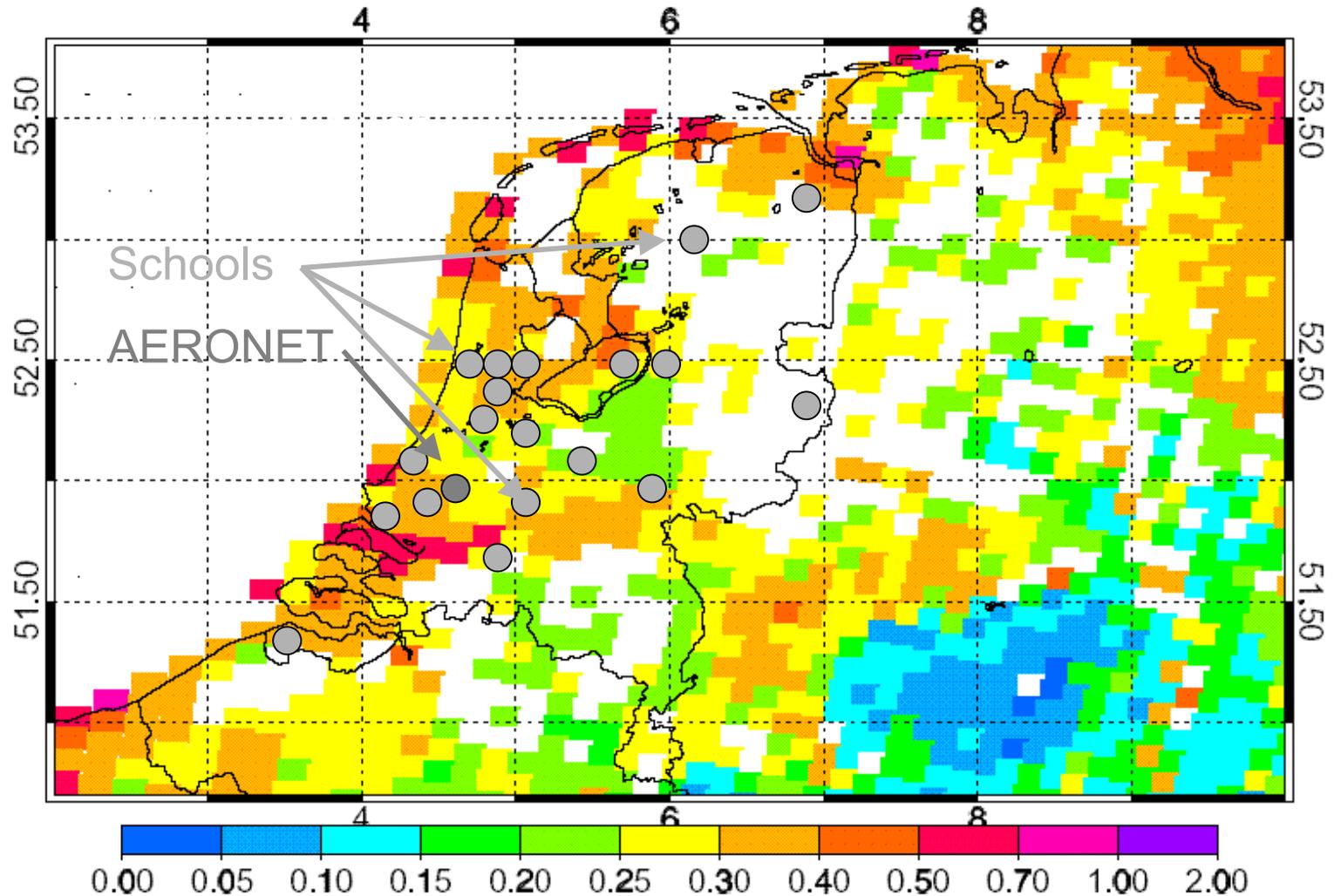
**Jiang et al**



# The GLOBE Program

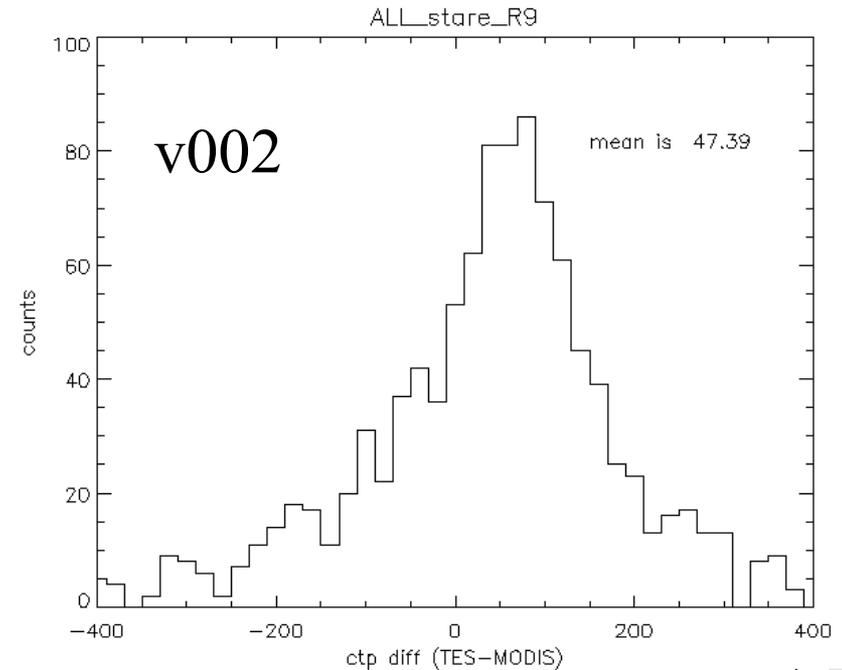
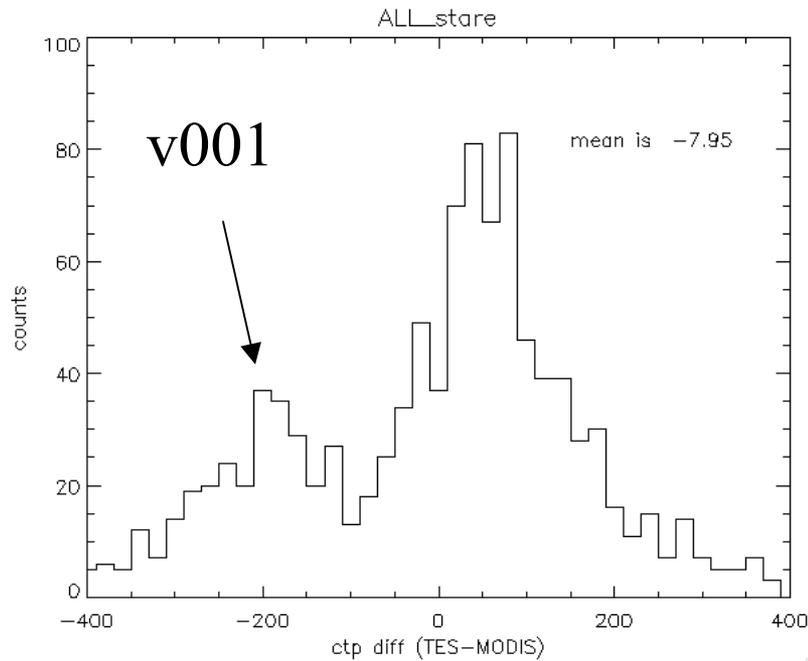
Boersma

School measurements provide potential for dense network that cannot be reached with professional instruments! (D. Brooks – Drexel University)



# Improvements in data products

# Improvement of TES v002



Cloud Top pressure differences (TES-MODIS)

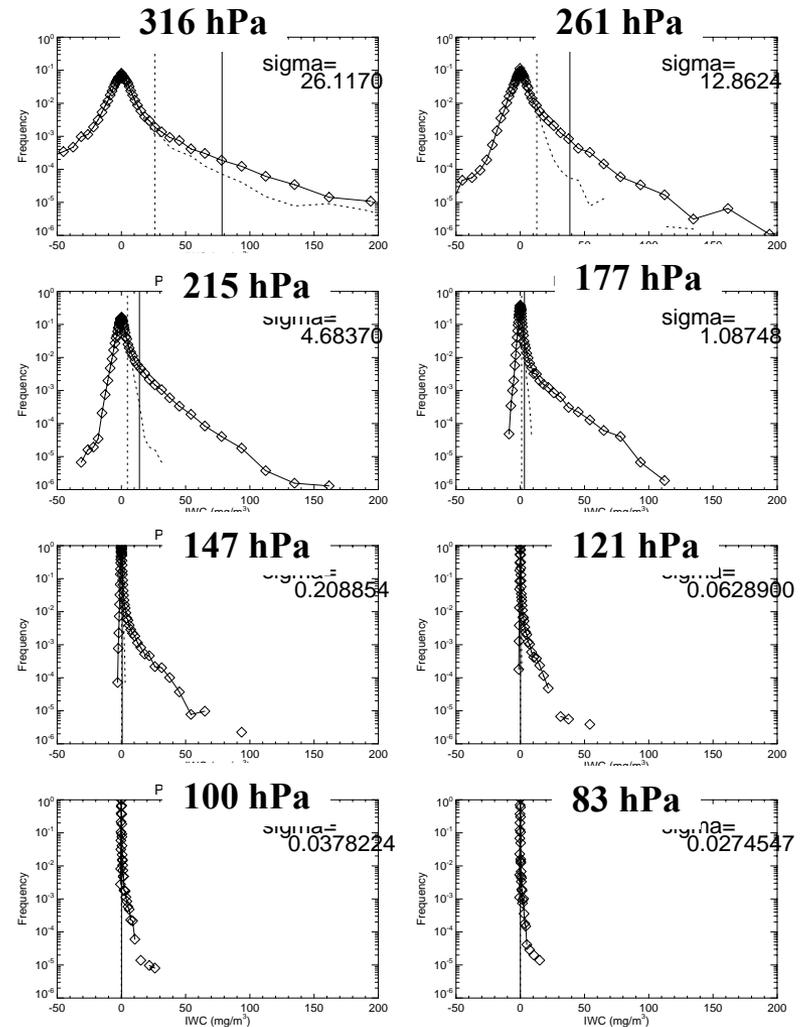
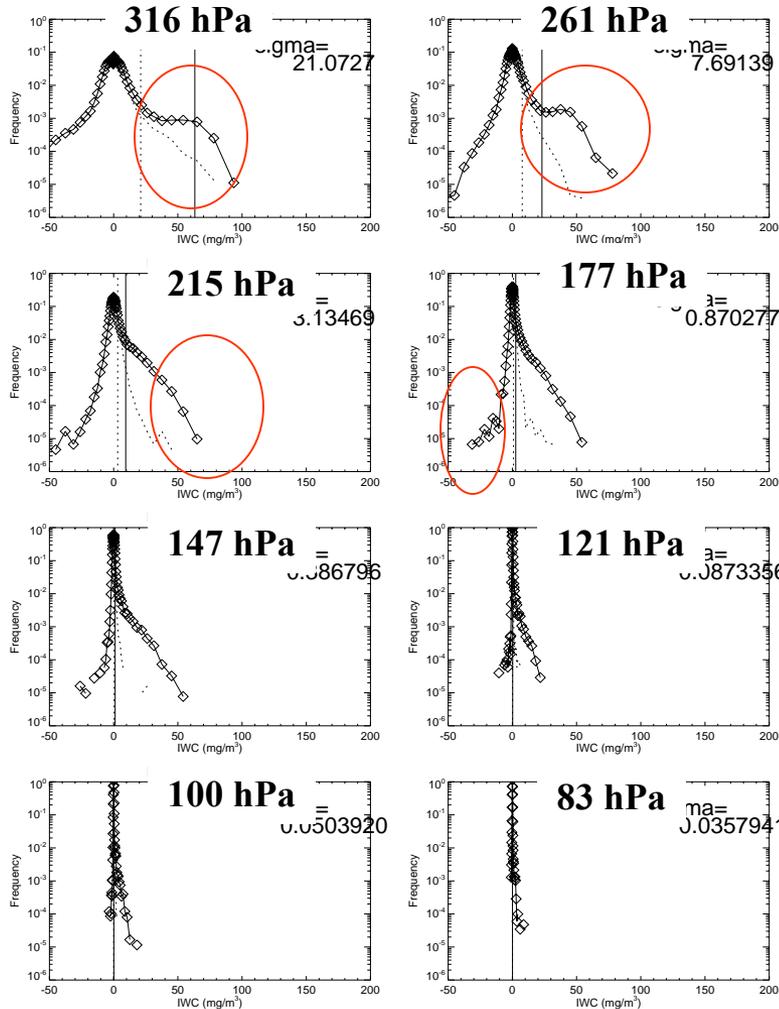
Cloud Top pressure differences (TES-MODIS)

- No longer have tail of -200 mb differences

# V2.1 vs. V1.5 IWC statistics: Probability Density Function (PDF)

- V1.5**
- lacks of IWC > 50 mg/m<sup>3</sup>
  - some large negative outliers
  - latitude-dependent biases
  - false alarms at high latitudes

- V2.1**
- more IWC > 50 mg/m<sup>3</sup>
  - no large negative outliers
  - little latitude-dependent biases
  - reduced false alarms at high latitudes



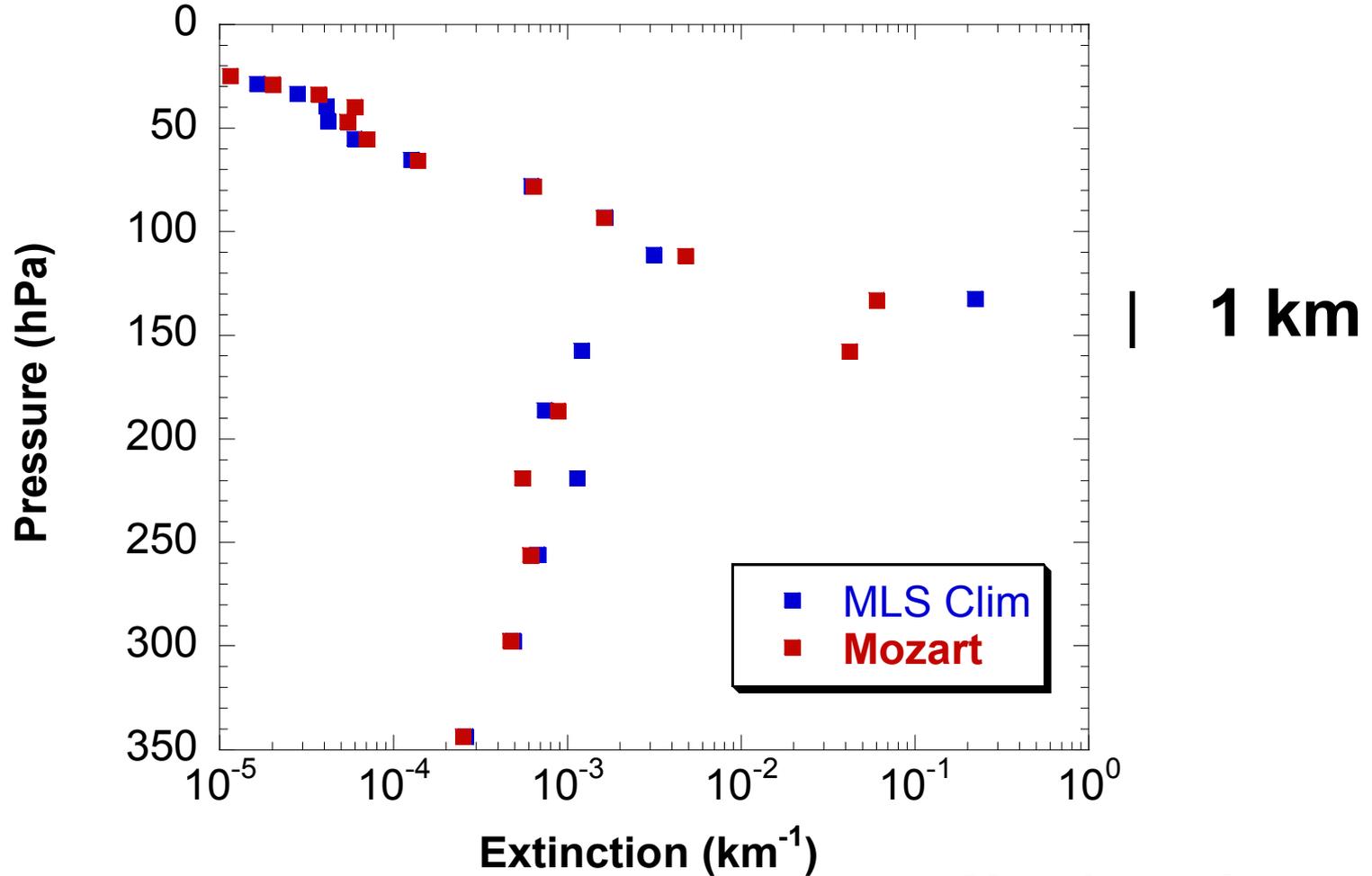
# Validation Challenges

# Very large Vertical Gradients in Extinction

CR-AVE February 2, 2006

HIRDLS Ch 6 (12  $\mu\text{m}$ )

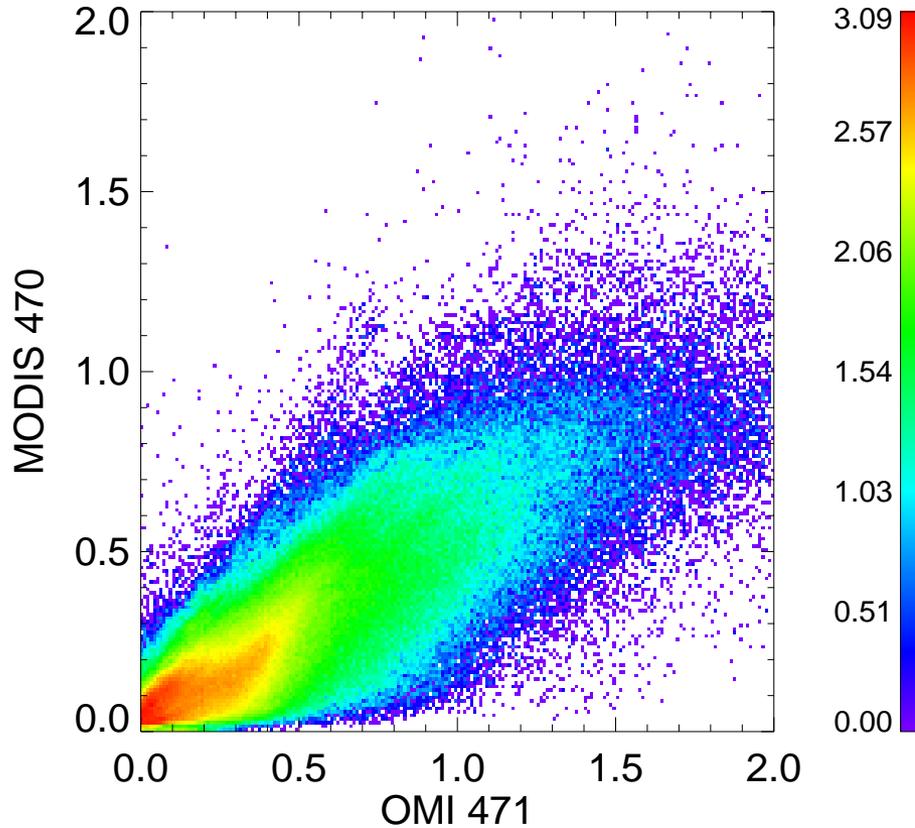
Lat 6, Lon -86, Prfid 5349



Massie et al

# Results of Comparison

## Braak et al



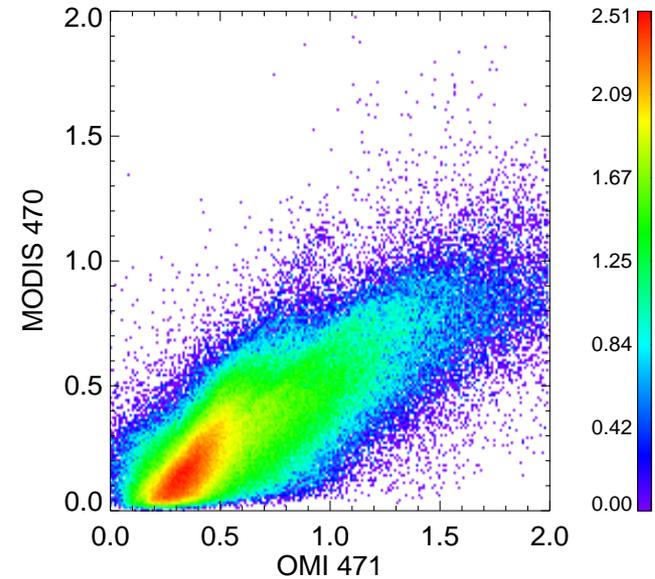
$r = 0.833, \alpha = 0.477, \beta = 0.053, N \sim 620,000$

**slope**

$r$  correlation,  $\alpha$  slope,  $\beta$  intercept,  $N$  # obs

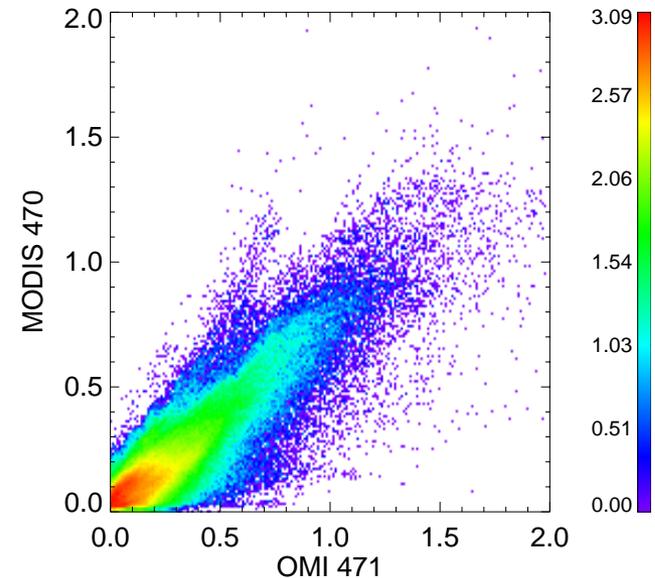
## Land only

$r = 0.814, \alpha = 0.466, \beta = 0.033, N \sim 260,000$



## Ocean only

$r = 0.862, \alpha = 0.650, \beta = 0.032, N \sim 350,000$



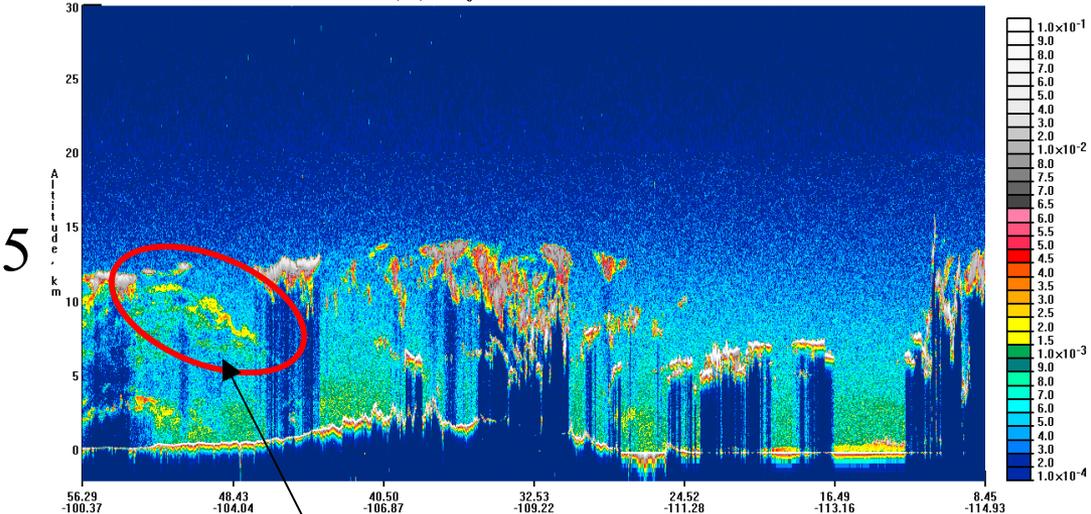
# OMI and CALIPSO Observations on July 5 and 7

Torres et al

Credits: CALIPSO Science Team

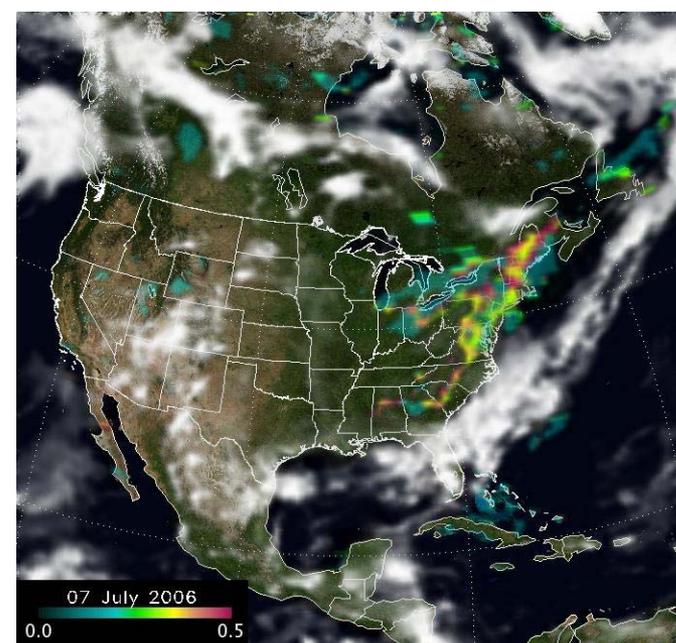
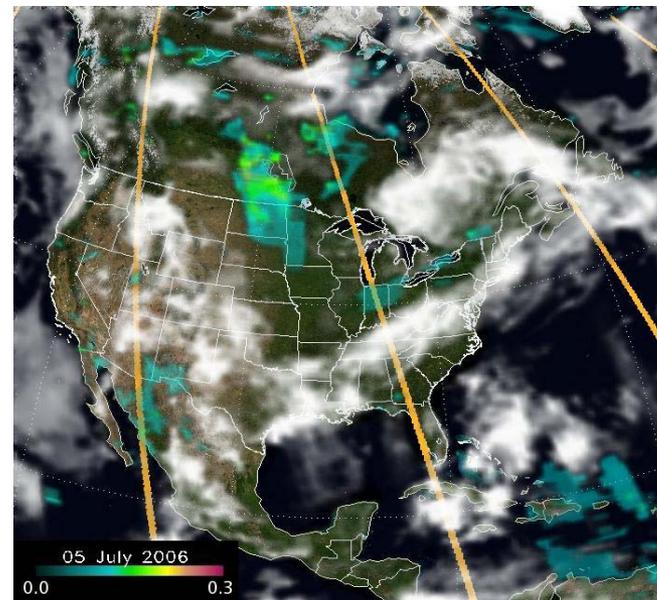
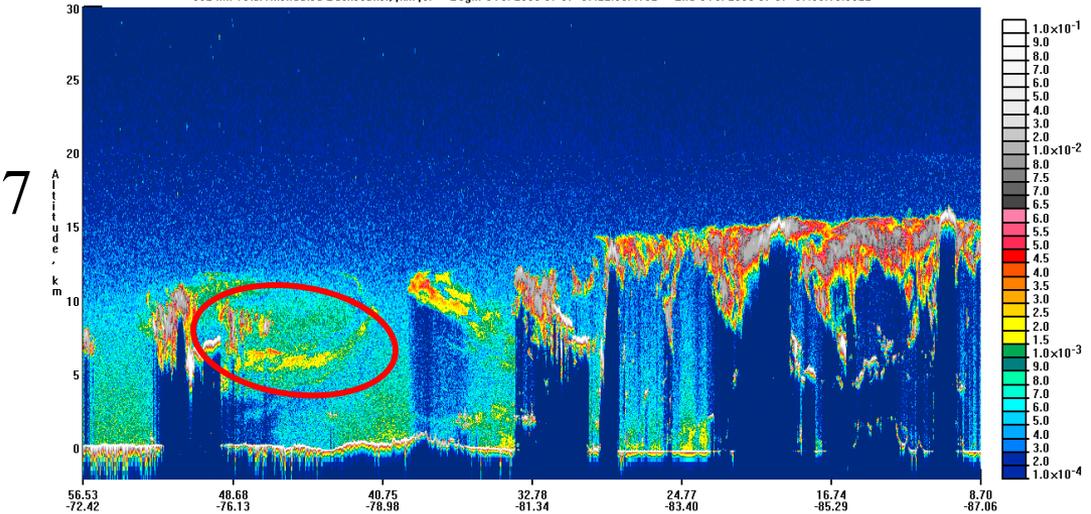


532 nm Total Attenuated Backscatter, /km /sr Begin UTC: 2006-07-05 09:14:17.8522 End UTC: 2006-07-05 09:27:36.8282



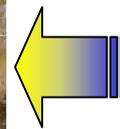
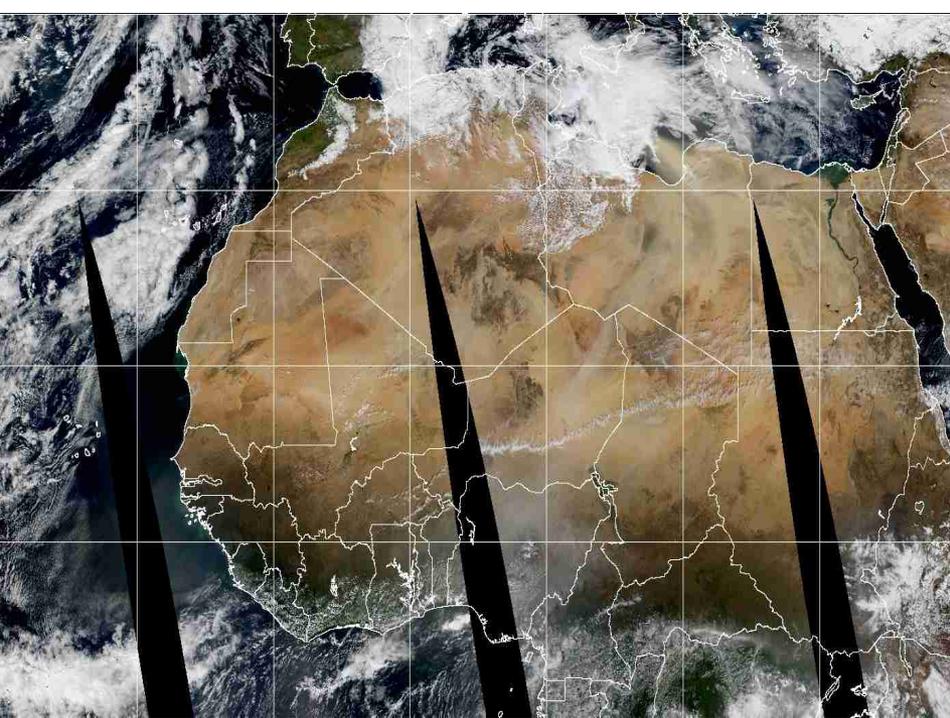
Aerosols between 7 and 10 km

532 nm Total Attenuated Backscatter, /km /sr Begin UTC: 2006-07-07 07:22:53.4162 End UTC: 2006-07-07 07:36:18.3922



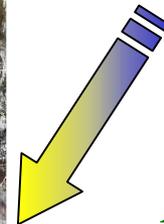
# **New Algorithms / Directions**

31 January 200

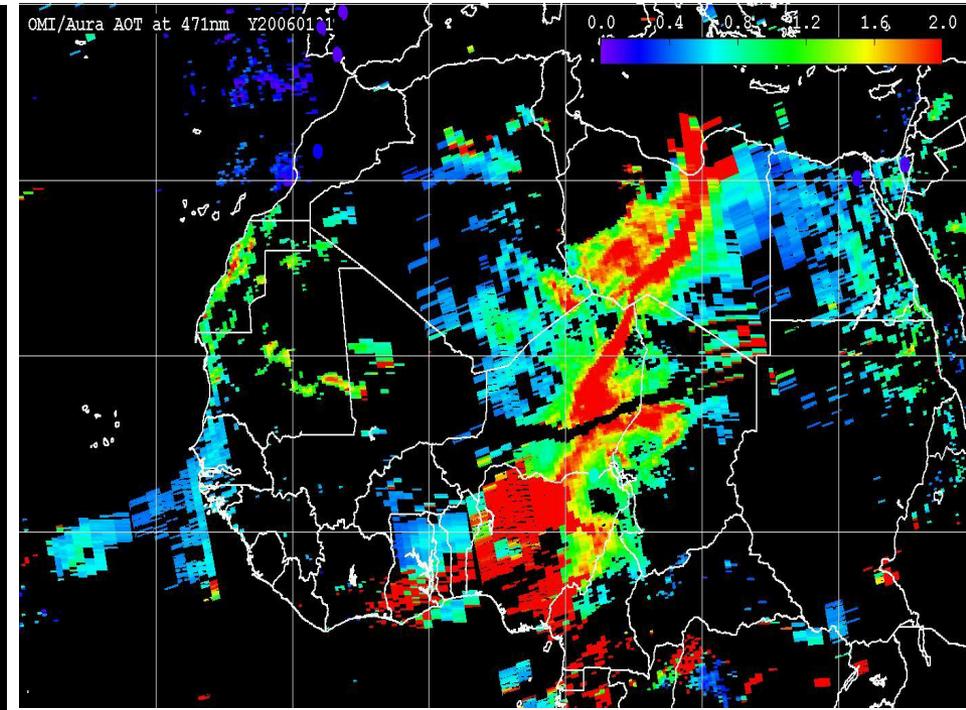
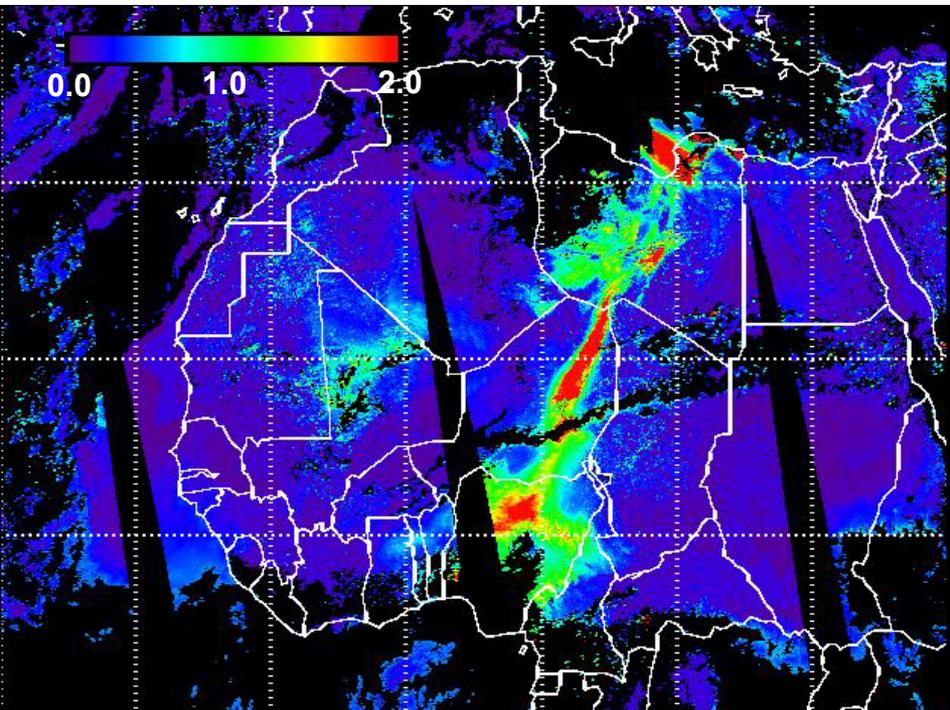


**MODIS/ Aqua RGB Image**

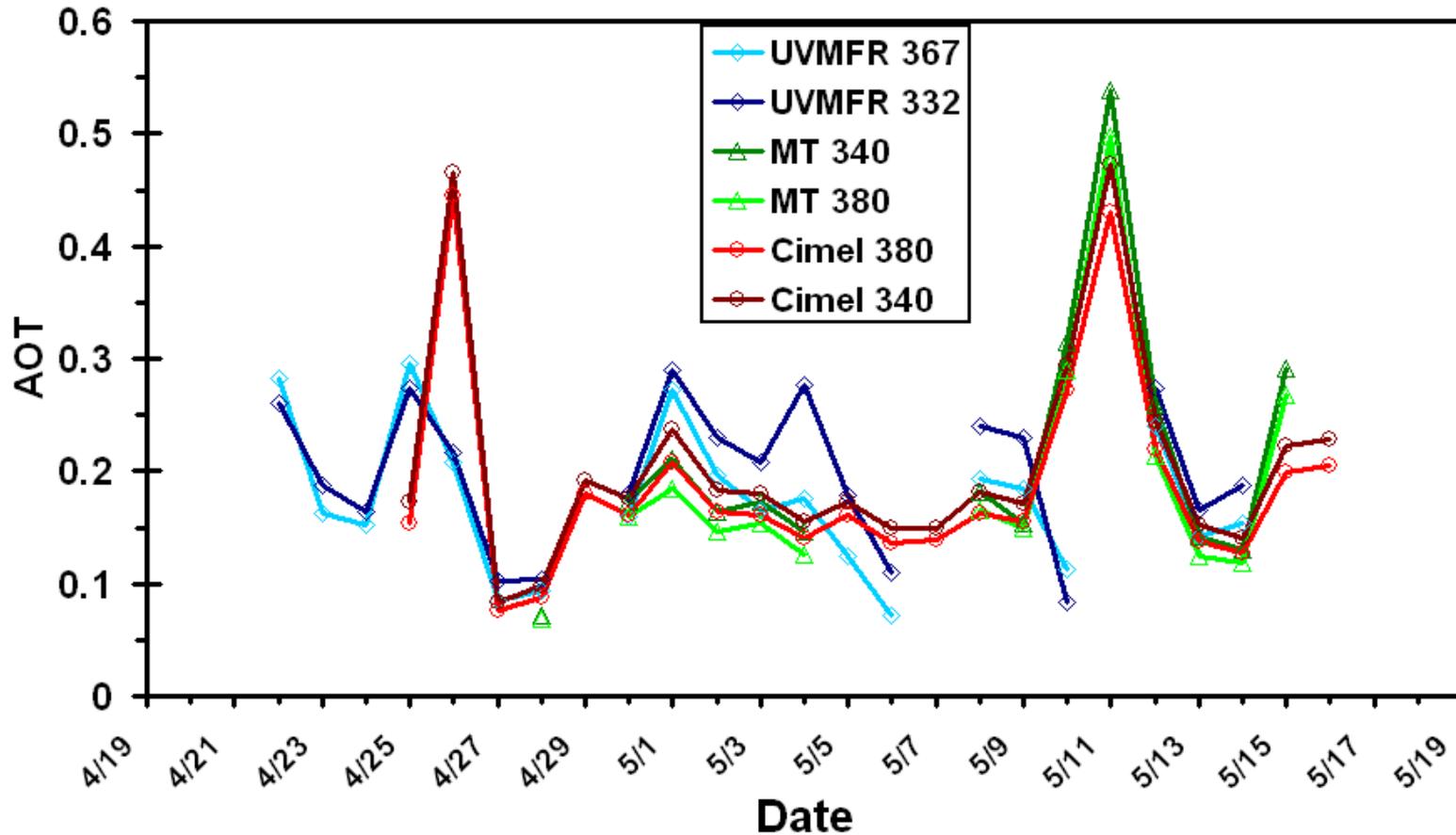
**MODIS *Deep Blue*: @470nm  
Aerosol Optical Thickness  
Hsu et al**



**OMI retrievals: @ 500 nm  
Aerosol Optical Thickness**



# Richland NATIVE AOT



# Multi-Wavelength Approach (20 $\lambda$ 's)

- Best fitting aerosol model
- Information on Type, AOD, SSA, Size, Height?
- Surface reflectivity? Clouds?

